CLAIMS

What is claimed is:

1. A radiation sensor comprising:

a substrate;

an antenna coupled to the substrate;

a thermal detector unit spaced from the antenna and from the substrate;

a multi-layered conductive lead in contact with the antenna and the thermal detector unit, wherein the conductive lead comprises a superconductive layer in electrical contact with the thermal detector unit and the antenna, and a support layer between the superconductive layer and the substrate.

2. The radiation sensor of claim 1 wherein the conductive lead further comprises a buffer layer disposed between the support layer and the superconductive layer

3. The radiation sensor of claim 2 wherein the buffer layer is characterized by a thermal conductivity $K<0.1$ W/cm-K.

4. The radiation sensor of claim 2 wherein the buffer layer comprises Yttria stabilized Zirconia.

5. The radiation sensor of claim 2 wherein the buffer layer defines a thermal conductivity that is less than one order of magnitude greater than a thermal conductivity defined by the superconductive layer.

6. The radiation sensor of claim 5 wherein the buffer layer defines a thermal conductivity that is less than a thermal conductivity defined by the superconductive layer.

7. The radiation sensor of claim 1 wherein the superconductive layer is selected from the group consisting of perovskite superconductors.

8. In a radiation sensor for measuring incident radiation comprising a substrate defining a cavity, a thermal detector unit disposed above the cavity, an antenna coupled to the substrate, and a conductor in contact with the antenna and the thermal detector unit, the improvement comprising:

the conductor defining a plurality of layers and comprising:

a superconductive layer;

a support layer between the superconductive layer and the substrate; and

a buffer layer between the support layer and the superconductive layer.

9. In a radiation sensor for measuring incident radiation comprising a substrate defining a cavity, a thermal detector unit disposed above the cavity, an antenna coupled to the substrate, and a conductor in contact with the antenna and the thermal detector unit, the improvement comprising:

the conductor defining a multi-layer structure and comprising:

a support layer adjacent to the substrate;

a superconductive layer opposite the substrate; and

a buffer layer between the support layer and the superconductive layer.

10. A method for making a radiation sensor comprising:

defining a cavity within a substrate;

depositing a filler material within the cavity;

depositing a thermal detector unit onto the filler material;

depositing an antenna onto the substrate;

depositing a multi-layer conductive lead to contact the thermal detector unit and the antenna, wherein the multi-layer conductive lead defines a layer of superconductive material; and

conductively bonding a first segment of the conductive lead to the antenna to form an electrically conductive pathway between the superconductive material and the antenna, and a second segment of the conductive lead to the thermal detector unit so as to form an electrically conductive pathway between the superconductive layer and the thermal detector unit.

11. The method of claim 10 further comprising removing the filler material.

12. The method of claim 10 wherein depositing a thermal detector unit comprises depositing a thermally reactive material over at least a portion of the filler material and delineating edges thereof to define the thermal detector unit.

13. The method of claim 10 wherein depositing an antenna onto the substrate comprises depositing a conductive material onto the substrate and delineating edges thereof to define the antenna.

14. The method of claim 10 wherein depositing a multi-layer conductive lead comprises;

depositing a layer of support material to contact the thermal detector unit and the antenna;

depositing a layer of buffer material over at least a portion of the support material;

depositing a layer of superconductive material over at least a portion of the buffer material; and

delineating at least one conductive lead by removing at least one of excess support material, excess buffer material, and excess superconductive material.

15. The method of claim 14 wherein depositing a layer of buffer material includes laser depositing with ion beam assist.

16. The method of claim 10 for making an array of radiation sensors, wherein

defining a cavity within a substrate comprises defining a plurality of cavities within a substrate;

depositing a filler material within the cavity comprises depositing filler material within the plurality of cavities;

depositing a thermal detector unit onto the filler material comprises depositing at least one thermal detector unit onto the filler material within each cavity;

depositing an antenna onto the substrate comprises depositing at least one antenna onto the substrate for each said cavity;

depositing a multi-layer conductive lead to contact the thermal detector unit and the antenna comprises depositing a plurality of conductive leads, each conductive lead contacting one thermal detector unit and one antenna; and

conductively bonding comprises bonding a first and second segment of each conductive lead to one of an antenna and a thermal detector unit.